

SWBAT: calculate electrical power

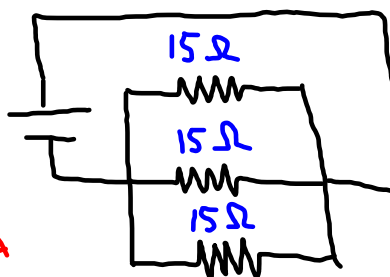
Jan 4-7:20 AM

Welcome!!!

H. Leslie Grebe

SECA Physics
Tuesday 10 March 2015

- * Pick up:
- slip of paper (for later)
- yellow concept sheet



Opening Questions:

Is this a series or parallel circuit? How much total resistance would you guess there is?

$$\text{PARALLEL } R_T = \frac{15\Omega}{3} = 5\Omega$$

Centering

Sep 7-7:04 AM



Mystery Resistor - extra credit

- You may work alone or with at most one other person of your choosing.
- Get a "Mystery Resistor" labeled with a letter from Leslie
- Use the same equipment that our teams used in class. Take measurements that will allow you to calculate the resistance (in Ohms) of your resistor.
- You may work when there is spare time in class or arrange other time with Leslie.

Due by 3:00 Friday 3/27

Jan 19-7:12 AM

Concept Sheet -- get yours out

We'll fill in a concept & "bike analogy" column today

5 or 6 rows

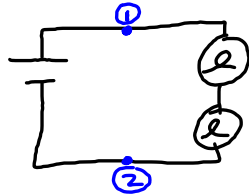
Concept	Meaning	Sym- bol	Units	Bike Analogy	WATER ANALOGY
CHARGE	PROPERTY OF PROTONS & ELECTRONS THAT CAUSES ATTRACTION & REPULSION	q	COULOMBS C		WATER ITSELF
VOLTAGE = ELECTRIC POTENTIAL	POTENTIAL BASED ON POSITION IN AN ELECTRIC FIELD. "PUSH"	V	VOLTS V $V = I \cdot R$	- PERSON - PEDALING \Rightarrow THE PUSH	- PUMP - PRESSURE \Rightarrow PUSH!
CURRENT	THE FLOW OF ELECTRIC CHARGE. = CHARGE TIME	I	AMPERES $A = \frac{C}{s}$	CHAINS, WHEEL, BIKE MOVING	FLOW OF WATER
RESISTANCE	OPPOSITION OF CURRENT (AGAINST THE FLOW)	R	OHMS Ω	BRAKES	
OHM'S LAW	VOLTAGE = CURRENT X RESISTANCE	$V = I \cdot R$	$1V = 1A \cdot 1\Omega$		
POWER	AMOUNT OF WORK DONE PER SECOND POWER = CURRENT X VOLTAGE	$P = I \cdot V$	WATTS W		

Extend Page

$$1W = 1V \cdot 1A \\ = \frac{J}{s}$$

Feb 23-7:34 AM

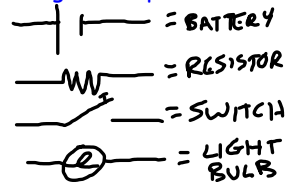
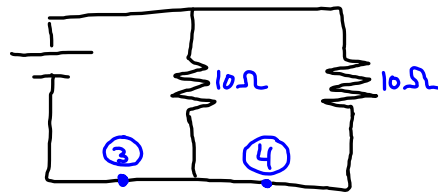
Circuit Puzzles: Predict, explain, observe



WILL THE CURRENT BE THE SAME AT ① & ②?

Observation: 0.45 A on both spots

Explanation: One path, one wire, all electrons flowing same speed



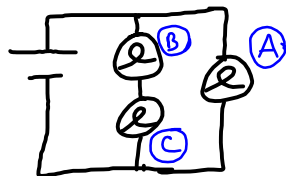
WILL THE CURRENT BE THE SAME AT ③ & ④?

Observation: 1.80 A at (3) and 0.90 A at (4)

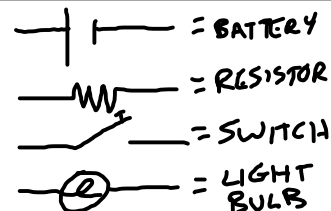
Explanation: All moving electrons need to use the wires closest to the battery. But the electrons don't need to go through both resistors! So some through each path.

Mar 23-7:45 AM

Circuit Puzzles: Predict, explain, observe



ALL BULBS ARE IDENTICAL



1) HOW WILL THE BRIGHTNESSES OF THE 3 BULBS COMPARE? ($A=B=C$? $A>B>C$? ...)

Observation: $A > B = C$

Explanation: Electrons going down far path have only one resistor.

Same push from the battery gets twice the brightness when there's half the resistance. B & C are in series so they have to have the same current (and brightness).

2) IF I UNSCREWED ③ (OR IT BURNED OUT), WHAT WOULD HAPPEN TO ① & ②?

Observation: A stayed the same. C went out.

Explanation: Thinking of Circuitopia airport, if one line had a passport checker AND visa checker, that line would just stop if one went on break.

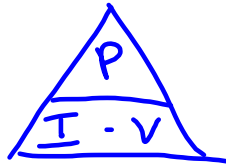
The other line that only required one check would just keep doing what it was doing, no matter how many other lines are open.

Mar 23-7:45 AM

cpcd34-2

Power in Circuits:

$$\text{POWER} = \text{CURRENT} \times \text{VOLTAGE}$$



How much power is needed to produce 3A using 12V?

$$P = I \cdot V = 3A \cdot 12V = 36W$$

How much current will result from 10 V and 60 W of power?

$$I = \frac{P}{V} = \frac{60W}{10V} = 6A$$

How many volts produce 10 A of current to make 5 W of power?

$$V = \frac{P}{I} = \frac{5W}{10A} = 0.5V$$

Mar 21-7:21 AM

Daily 3 Questions

- * Every day except test/project days
- * 3 Questions on the topics of the day
- * Main source of daily points
- * I am happy to give credit when I have no concerns about someone giving or getting help with the answers.

CP homework - Create and solve a word problem using $P = I \cdot V$

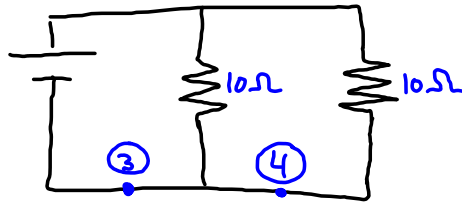
You can't get your points if you don't have your NAME!!!

Name	Period
1.	
2.	
3.	

Sep 9-7:32 AM

1) How does current compare at 3 & 4?

- A. bigger at 3
- B. bigger at 4
- C. 3 = 4



2) What is the **power** when a voltage of 120 V drives a 2A current through a device?

$$P = I \cdot V = 120V \cdot 2A = 240W$$

3) How much current will result from 10 V and 60 W of power?

$$I = \frac{P}{V} = \frac{60W}{10V} = 6A$$

$$60W = 0.06kW$$

$$120V$$

$$8¢/kWh$$

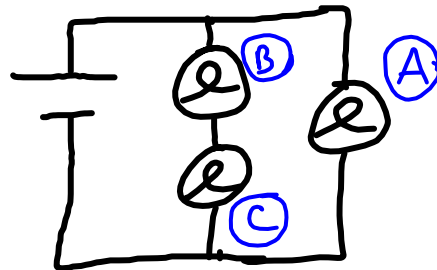
$$kW \cdot hr \cdot 8¢$$

$$hr = 24 \times 7 \times 30$$

Feb 18-6:59 AM

1) Which bulb will be brightest?

- A.
- B.
- C.
- All the same.



2) What is the **power** when a voltage of 120 V drives a 2A current through a device?

3) How much current will result from 10 V and 60 W of power?

Feb 18-6:59 AM